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Cleome HL7 Interface Specification

Version 11

Interface Specification Overview

Overview

The ClearCanvas Cleome is a Picture Archiving and Communication system used in medical imaging. It is composed of the following components:

- ClearCanvas ImageServer: A DICOM image management server
- ClearCanvas Workstation: A diagnostic medical imaging workstation
- ClearCanvas IntegrationServer: A server for processing HL7 messages and distributing them to other components
- ClearCanvas WebPortal: A referring physician's portal
- ClearCanvas Webstation: An HTML5 medical imaging viewer

The IntegrationServer processes HL7 messages, and relays actions to Cleome components. This document details the HL7 messages processed by the IntegrationServer and how it integrates with the other Cleome components.

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Introduction

Revision History

Document Version	Date of Issue	Author	Description
1.0	January 11, 2014	Steve Wranovsky	Initial version for Cleome 11.0.

Audience

This document is intended for people who need to integrate Cleome into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as those who need to have a detailed understanding of the HL7 features of the product. It is assumed that readers have a working knowledge of HL7.

Remarks

This document is the HL7 Interface Specification for Cleome. This document should be read and understood in conjunction with the HL7 standard. Readers thus need a working knowledge of HL7. Note that HL7, by itself, does not guarantee interoperability. However, this Interface Specification facilitates a first level validation for interoperability between different applications supporting the same HL7 functionality.

Communication Interface

The HL7 Standard recommends the Minimal Lower Layer Protocol (MLLP) for communication between HL7 systems. For this purpose, the HL7 Interface of Cleome provides unidirectional TCP/IP socket interface. The Lower Layer Protocol defined by the HL7 Standard is implemented as follows:

- Message Start Character: 0x0B
- Segment End Character: 0x0D
- Message Stop Characters: 0x1C and 0x0D
- Character Encoding: UTF-8

Functional Overview

General

IntegrationServer

The IntegrationServer supplies a mechanism for processing HL7 message that is shared by the Cleome components. The functionality includes:

- Reception of incoming HL7 messages

- Queuing and processing of HL7 messages including error handling during processing.
- Trigger actions in other Cleome components based on the received HL7 messages.
- The ability to reprocess received messages.

Patient Information Reconciliation

Cleome will process incoming patient update and merge messages. The patient reconciliation functionality includes:

- Updating ImageServer studies with new patient demographics based on a matching Patient ID.
- Merging patients by updating the Patient ID of matching DICOM studies to a new Patient ID.

Incoming Reports

Cleome can accept, store, and display reports that match specific studies. The reports functionality includes:

- Reception of incoming HL7 ORU^R01 message containing reports
- Matching reports to existing studies.
- Creating a DICOM Encapsulated PDF version of the report and storing on the ImageServer which can be viewed in the ClearCanvas Webstation and ClearCanvas Workstation.

Message Descriptions

Overview

Cleome is able to handle a subset of ADT messages for performing patient updates and merges. Additionally, ORU messages containing reports are processed and imported.

Supported HL7 Versions

The Cleome HL7 interface has been primarily tested with HL7 Version 2.5.1. It will also accept messages encoded as:

- HL7 Version 2.5.1
- HL7 Version 2.4
- HL7 Version 2.3.1

Supported HL7 Messages

The Cleome HL7 interface supports the reception and processing of several message types:

- ADT^A08 – Update Patient Information
- ADT^A40 – Merge Patient

- ORU^R01 – Observation report – unsolicited

Note that Cleome IntegrationServer will accept other HL7 message types and acknowledge them, but will ignore them.

ADT Messages

ADT^A08 – Update Patient Information

This message type is used to update demographic information for a specific patient. The Cleome IntegrationServer will send a command to the ImageServer to have it update the Patient's Name, Patient Sex, and Patient's Birth Date field for all studies that match based on the Patient ID.

Segment Specification

The following table lists the expected segments within the ADT^A08 message processed by Cleome. All other segments listed in the HL7 Standard for ADT^A08 messages are ignored by Cleome.

ADT A08	Patient Administration Message
MSH	Message Header
PID	Patient Identification

The following sections describe the fields within each of the segments that are accessed by Cleome to perform the patient update.

MSH – Message Header Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	1	ST	R	Field Separator	'|' is the expected value
2	4	ST	R	Encoding Characters	'^~\&' is the expected value
3	227	HD	O	Sending Application	Used in acknowledgement message
4	227	HD	O	Sending Facility	Used in acknowledgement message
5	227	HD	O	Receiving Application	Used in acknowledgement message
6	227	HD	O	Receiving Facility	Used in acknowledgement message
7	26	TS	R	Date/Time of Message	Used in acknowledgement message
8	40	ST	O	Security	Used in acknowledgement

					message
9	15	MSG	R	Message Type	'ADT^A08' is the expected value
10	20	ST	R	Message Control ID	Used in acknowledgement message
11	3	PT	R	Processing ID	Used in acknowledgement message
12	60	VID	R	Version ID	Used in acknowledgement message
13	15	NM	O	Sequence Number	Sequence of messages

PID – Patient Identification Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	4	SI	O	Set ID – PID	
2	20	CX	B	Patient ID	
3	250	CX	R	Patient Identifier List	The Patient ID to identify the patient to update. The Assigning Authority is also accessed from this field. Note: If this field contains more than one identifier, only the first one is used.
5	250	XPN	R	Patient Name	Patient's Name to update to.
7	26	TS	O	Date/Time of Birth	Patient's Birthdate to update to.
8	1	IS	O	Administrative Sex	The Patient Sex

ADT^A40 – Merge Patient Information

An A40 event is used to signal a merge of records for a patient that was incorrectly filed under two different identifiers. The Cleome IntegrationServer will send a command to the ImageServer to have it update any studies for the Prior Patient ID to the new Patient ID.

Segment Specification

The following table lists the expected segments within the ADT^A40 message processed by Cleome. All other segments listed in the HL7 Standard for ADT^A40 messages are ignored by Cleome.

ADT A40	Merge Patient Information

MSH	Message Header
PID	Patient Identification
MRG	Merge Information

The following sections describe the fields within each of the segments that are accessed by Cleome to perform the patient merge.

MSH – Message Header Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	1	ST	R	Field Separator	'|' is the expected value
2	4	ST	R	Encoding Characters	'^~\&' is the expected value
3	227	HD	O	Sending Application	Used in acknowledgement message
4	227	HD	O	Sending Facility	Used in acknowledgement message
5	227	HD	O	Receiving Application	Used in acknowledgement message
6	227	HD	O	Receiving Facility	Used in acknowledgement message
7	26	TS	R	Date/Time of Message	Used in acknowledgement message
8	40	ST	O	Security	Used in acknowledgement message
9	15	MSG	R	Message Type	'ADT^A08' is the expected value
10	20	ST	R	Message Control ID	Used in acknowledgement message
11	3	PT	R	Processing ID	Used in acknowledgement message
12	60	VID	R	Version ID	Used in acknowledgement message
13	15	NM	O	Sequence Number	Sequence of messages

PID – Patient Identification Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	4	SI	O	Set ID – PID	
3	250	CX	R	Patient Identifier List	The Patient ID to update

					matching studies to. The Assigning Authority is also accessed from this field and is used as the Issuer of Patient Id field. Note: If this field contains more than one identifier, only the first one is used.

MRG – Merge Patient Information Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	250	CX	R	Prior Patient Identifier List	The Prior Patient ID to merge the patient from. Matching studies are searched for based on this Patient ID on the ImageServer. The Assigning Authority is also read from this field and passed to the ImageServer.

ORU Messages

ORU^R01

The HL7 ORU message is for transmitting an observational report for a specific study to other systems.

Segment Specification

The following table lists the expected segments within the ORU^R01 message processed by Cleome. All other segments listed in the HL7 Standard for ORU^R01 messages are ignored by Cleome.

ADT A40	Merge Patient Information
MSH	Message Header
PID	Patient Identification
PV1	Merge Information
OBR	Observation Request
OBX	Observation related to OBR
ZDS	Z Segment

The following sections describe the fields within each of the segments that are accessed by Cleome to create the report.

MSH – Message Header Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	1	ST	R	Field Separator	'|' is the expected value
2	4	ST	R	Encoding Characters	'^~\&' is the expected value
3	227	HD	O	Sending Application	Used in acknowledgement message
4	227	HD	O	Sending Facility	Used in acknowledgement message
5	227	HD	O	Receiving Application	Used in acknowledgement message
6	227	HD	O	Receiving Facility	Used in acknowledgement message
7	26	TS	R	Date/Time of Message	Used in acknowledgement message
8	40	ST	O	Security	Used in acknowledgement message
9	15	MSG	R	Message Type	'ADT^A08' is the expected value
10	20	ST	R	Message Control ID	Used in acknowledgement message
11	3	PT	R	Processing ID	Used in acknowledgement message
12	60	VID	R	Version ID	Used in acknowledgement message
13	15	NM	O	Sequence Number	Sequence of messages

PID – Patient Identification Segment

SEQ	LEN	DT	OPT	Element Name	Value
3	250	CX	R	Patient Identifier List	The Patient ID to identify the patient. The Assigning Authority is also accessed from this field. Note: If this field contains more than one identifier, only the first one is used.

5	250	XPN	R	Patient Name	Patient's Name
11	250	XAD	O	Patient Address	Address used in reporting

PV1 – Patient Visit Segment

SEQ	LEN	DT	OPT	Element Name	Value
8	250	XCN	O	Referring Doctor	Maps to the DICOM Referring Physician's Name, used in

OBR – Observations Request Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	4	SI	O	Set ID – OBR	
2	22	EI	C	Placer Order Number	
3	22	EI	C	Filler Order Number	
4	250	CE	R	Universal Service identifier	
7	26	TS	C	Observation Date/Time	The Date/Time of the report.
16	250	XCN	O	Ordering Provider	Ordering Physician's Name
18	60	ST	O	Placer Field 1	The DICOM Accession Number
31	250	CE	O	Reason for Study	
32	200	NDL	O	Principal Result Interpreter	

OBX – Observation related to OBR Segment

SEQ	LEN	DT	OPT	Element Name	Value
2	2	ID	C	Value Type	
3	250	CE	R	Observation Identifier	
5	99999	Varies	C	Observation Value	
11	1	ID	R	Observation Result Status	

ZDS – Z Segment

SEQ	LEN	DT	OPT	Element Name	Value
1	64			Study Instance UID	

IPC – Imaging Procedure Control Segment

SEQ	LEN	DT	OPT	Element Name	Value
3	64	EI		Study Instance UID	

Notes

When processing a report, the Cleome IntegrationServer will perform a number of queries against the ImageServer until it finds a matching study. The first queries will be done by attempting to find a matching Study Instance UID. Subsequent queries will be done attempting to find a matching Accession Number. The following fields are used in the ORU^R01 message to search the ImageServer for a matching study based on Study Instance UID:

- Study Instance UID (ZDS Segment, Field 1-1)
- Study Instance UID (IPC Segment, Field 3-1)

Note that both of these fields are not defined in HL7 for a standard ORU^R01. These fields are at least checked for in the message, however, to find a match.

The following fields are then searched in the ImageServer for a match to an existing Accession Number on a study:

- Placer field 1 (OBR Segment Field 18-1)
- Placer Order Number (OBR Segment, Field 2-1)
- Filler Order Number (OBR Segment, Field 3-1)

If a matching study is found, a message is sent to the ImageServer to create a report associated with the study. If a match is not found, the action of the IntegrationServer is configuration dependent. It may fail or mark as processed the ORU message.